

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 1317.1067 (MDS)

First Named Inventor or Application Identifier:

Chong-Mok PARK

Express Mail Label No.

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:

Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☒ Fee Transmittal Form
2. ☒ Specification, Claims & Abstract [Total Pages: 18]
3. ☒ Drawing(s) (35 USC 113) [Total Sheets: 8]
4. ☒ Oath or Declaration [Total Pages:]
 - a. ☒ Newly executed (original or copy)
 - b. ☐ Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional with Box 17 completed)
 - i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation by Reference (usable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Microfiche Computer Program (Appendix)
7. ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
 - a. ☐ Computer Readable Copy
 - b. ☐ Paper Copy (identical to computer copy)
 - c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☒ Assignment Papers (cover sheet & document(s))
9. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☐ Power of Attorney
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
14. ☐ Small Entity Statement(s) ☐ Statement filed in prior application, status still proper and desired.
15. ☒ Certified Copy of Priority Document(s) (if foreign priority is claimed)
16. ☐ Other:

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: / **18. CORRESPONDENCE ADDRESS**

STAAS & HALSEY LLP
Attn: Michael D. Stein
700 Eleventh Street, N.W., Suite 500
Washington, DC 20001

Telephone: (202) 434-1500
Facsimile: (202) 434-1501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Chong-Mok PARK

Serial No.: To be assigned

Group Art Unit: Unassigned

Filed: July 28, 2000

Examiner: Unassigned

For: METHOD OF ARRANGING DIVIDED RECORDING AREA SEGMENTS
OF RECORDING MEDIUM IN BROADCAST RECEIVING SYSTEM

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Before examination of the above-identified application, please amend the application as follows:

IN THE SPECIFICATION:

Please AMEND the specification as follows:

Page 1,

line 12, change "the" to --another--; and

line 14, change "the" to --another.

Page 3,

line 10, after "back" insert --(a process to read data, store the read data in a buffer, and then supply the stored data to a user visibly and/or audibly)--;

Page 2

line 18, change "read" to --accessed to read or write--;

line 21, change "video stream" to --current video stream by buffer-controlling data to be input and output to the HDD--; and

line 22, after "time." insert --In other words, the previously recorded data of a specific channel can not be reproduced while recording a plurality of video streams (i.e., the corresponding broadcast signals to be input from a plurality of channels) since data buffering control is not easy, and is inefficient because of the data access speed of the HDD.--.

Page 4,

line 7, delete "a" and then change "program" to --programs--.

Page 5,

line 2, change "files." to --files. When a user commands a function of time-delayed watching and leaves a television set, the broadcast signal of the channel currently being watched from this point in time is stored in a circular buffer area. Thus, a user has access to reproduce a broadcast signal and to see a screen from the point in time that he or she leaves the television set. In this case, the continuously received broadcast signal is continuously recorded and stored in a circular buffer area, to be reproduced after a predetermined time passes.--

Page 6,

line 9, change "the" to --another--, and then at the end of the line insert --In this instance, the broadcast receiving system enables recording of a broadcast signal of one channel while simultaneously recording a broadcast signal of another channel.--;

line 14, insert at the end of the line, --A compressor (input signal processor) 22 receives a video baseband signal which is simply compressed. The outputs of the compressors 18, 20 and 22 are supplied to a switching node 23, which provides its output to a dual port RAM 32.--; and

line 18, change "a" (second occurrence) to --the--.

Page 7,

line 17, delete "a" and change "program" to --programs--; and

line 19, after "is" (second occurrence) insert --currently--.

Page 8,

line 4, change "streams." to --streams, such as text information as general information other than video information.--; and

line 14, after "a" insert --broadcast-- and change "being broadcast" to --being watched by a user--.

REMARKS

This Preliminary Amendment is submitted to improve the form of the specification as originally-filed.

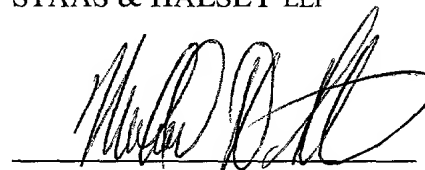
It is respectfully requested that this Preliminary Amendment be entered in the above-referenced application.

If any further fees are required in connection with the filing of this Preliminary Amendment, please charge same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

By:



Michael D. Stein

Registration No. 37,240

700 Eleventh Street, N.W.
Suite 500
Washington, D.C. 20001
(202) 434-1500

Date: July 28, 2000

TITLE OF THE INVENTION

METHOD OF ARRANGING DIVIDED RECORDING AREA SEGMENTS OF RECORDING MEDIUM IN BROADCAST RECEIVING SYSTEM

5 CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of Korean Application No. 99-30938, filed July 28, 1999, in the Korean Patent Office, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

10 The present invention relates generally to a broadcast receiving system which can simultaneously support time-delayed watching of a broadcast program and recording/reproduction of the program, and in particular, to a method of arranging divided recording area segments in a recording medium to allow time-delayed watching of a broadcast program, while the program is being recorded/reproduced.

15 2. Description of the Related Art

A hard disk drive (HDD) in a computer system is randomly accessible. Due to its advantages of low cost and large capacity relative to other auxiliary memories and a high data transmission rate, the HDD is used as a random access storage device for a broadcast receiving system.

20 A broadcast receiving system with a random access storage device enables simultaneous recording/reproduction and time-delayed broadcasting of video streams.

This can be achieved by controlling buffering of video streams input/output to/from an HDD.

There will be given a description of a method of arranging video streams on a hard disk surface as a recording medium in a broadcast receiving system which supports simultaneous time-delayed watching and recording/reproduction of the video streams.

FIG. 1 illustrates a hard disk managed as a circular buffer in a broadcast receiving system for time-delayed watching, and FIG. 2 illustrates a hard disk managed to record a plurality of video streams uncontinuously.

In the case of a hard disk managed as a circular buffer, video streams are recorded in blocks of a fixed size as shown in FIG. 1. A write point W and a read point R are set on a surface of the hard disk. New video streams are recorded, moving a head clockwise from the write point W, and predetermined video streams are played back by randomly accessing the circular buffer at a specific time.

On the other hand, to uncontinuously arrange video streams on a hard disk drive as shown in FIG. 2, a surface of the hard disk is divided into blocks of a fixed size and video streams are recorded in video files, each including a plurality of blocks. In this case, the blocks are not successively arranged because deletion of video files of different sizes result in uncontinuous free blocks. Information about each video file (title, time information, and so on) and information about the positions of blocks in each video file are recorded in a control information area.

FIGS. 3A through 3D are exemplary I/O (Input/Output) transaction scheduling diagrams for an HDD on/from which video streams are recorded/reproduced in real time. In FIGS. 3A through 3D, three video streams are processed using a C-LOOK algorithm by way of example. The C-LOOK algorithm is similar to a SCAN-Earliest-Deadline-First (SCAN-EDF) scheme disclosed in "I/O Issues in a Multimedia System," Reddy A.L.N. and Wyllie J.C., IEEE Computer Vol. 27. No. 3, March 1994, pp. 67-74, "Multimedia File Systems Survey: Approaches for Continuous Media Disk

Scheduling,"Ralf Steinmetz, Computer Communications, Vol. 18, No. 3, March 1995, pp. 133-144, and a gated operation disclosed in U.S. Patent No. 5,754,882. Hence, its description is omitted herein.

Referring to FIGS. 3B through 3D, video streams #1 and #2 are being played back
5 and video stream #3 is being recorded. In most video stream processing methods, an HDD I/O control is implemented at every predetermined period T and video streams are processed in each period. For example, if video streams #1 and #2 are read from corresponding blocks on a hard disk surface in period T_{i-1} , they are played back in period T_i (this corresponds to consumption from a video processor's viewpoint). For continuous
10 reproduction without interruption, blocks to be played back in the next period should be read from the HDD in the current period. For recording, blocks should be generated in the current period and then transmitted to the HDD in the next period. The order of processing video streams in a period depends on an I/O transaction scheduling scheme. In the C-LOOK algorithm, the order of processing video streams corresponds to a head
15 moving direction. Assuming that a head of the HDD is moving from an outermost circumferential track to an innermost circumferential track and video stream blocks #1, 2, and 3 are located in tracks #10, 100, and 60, respectively, the video streams #1, 3, and 2 are read in this order in T_i as shown in FIGS. 3A through 3D.

A broadcast receiving system which manages a hard disk area as a circular buffer
20 as shown in FIG. 1 can reproduce a previously recorded video stream with a time delay while recording a video stream. However, it cannot record and reproduce a plurality of video streams at the same time. In addition, video streams cannot be formed in video file units and an arbitrary video file cannot be deleted.

On the other hand, a broadcast receiving system which arranges video streams
25 uncontinuously as shown in FIG. 2 can store recorded video streams in video files since it can utilize hard disk space freely. But buffer management for time-delayed watching is

not easy because blocks are not automatically reused in a limited area as compared to a circular buffer. This is because free blocks are scattered.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a method of
5 overcoming conventional problems encountered in using a recording area of a recording medium in a broadcast receiving system which can support time-delayed watching and recording/reproduction of a broadcast program at the same time.

It is another object of the present invention to provide a method of efficiently
10 managing divided recording area segments of a recording medium to simultaneously provide time-delayed watching and recording/reproduction of a plurality of video streams in a broadcast receiving system.

It is a further object of the present invention to provide a method of managing
15 divided recording area segments of a recording medium to simultaneously provide time-delayed watching and high speed recording/reproduction of a plurality of video streams in a broadcast receiving system.

Additional objects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

These and other objects of the present invention can be achieved by providing a
20 method of arranging divided recording area segments of a recording medium in a broadcast receiving system having a random access storage device. In the method, a circular buffer area is disposed in a first predetermined position of the recording medium, for recording a first broadcast signal in real time while reproducing a previously recorded second broadcast signal, a video file area is disposed in a second predetermined position
25 of the recording medium, for recording a third broadcast signal in a logical file at a

predetermined time, and a control information area is disposed in a third predetermined position of the recording medium, for recording information about recorded files.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the invention will become apparent and more readily appreciated from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings of which:

The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings in which:

FIG. 1 illustrates a conventional hard disk managed as a circular buffer in a broadcast receiving system for time-delayed watching;

FIG. 2 illustrates a conventional hard disk managed to arrange a plurality of video streams uncontinuously;

FIGS. 3A through 3D are exemplary I/O transaction scheduling diagrams of a conventional HDD for recording and reproducing a plurality of video streams in real time;

FIG. 4 is a block diagram of a broadcast receiving system which can support time-delayed watching and recording/reproduction of a broadcast program according to an embodiment of the present invention;

FIG. 5 illustrates arrangement of hard disk recording area segments according to the embodiment of the present invention;

FIG. 6 illustrates video streams recorded in the hard disk recording area segments according to the embodiment of the present invention;

FIG. 7 illustrates a procedure of processing streams assigned as shown in FIG. 6 in a C-LOOK algorithm; and

FIG. 8 is a simplified view of a hard disk recording area according to the embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention will be described hereinbelow with reference to the accompanying drawings. In the following description, well-known functions or constructions are not described in detail since they would obscure the invention in unnecessary detail.

FIG. 4 is a block diagram of a broadcast receiving system capable of broadcasting a program with a time delay and recording/reproducing the program simultaneously.

Referring to FIG. 4, a broadcast signal receiver 10 includes an RF (Radio Frequency) tuner 12 for receiving an external digital broadcast signal, RF tuners 14 and 16 for receiving external analog broadcast signals, and video compressors 18 and 20 for converting analog signals received from the RF tuners 14 and 16 to digital signals and compressing the converted digital signals, respectively.

A random access storage device 30 records digital video streams received from the broadcast signal receiver 10 on a hard disk surface (not shown), reads the stored video streams, and outputs the read video streams to a video recovery unit 50 under the control of a controller 40. As is well known, the random access storage device 30 comprises a dual port RAM 32 for temporarily storing the digital video streams, a hard disk (hard disks) for permanently storing the digital video streams, an HDD controller for controlling the HDD to be driven, and an expander for expanding the HDD. The expander is an IEEE 1394 interface.

The video recovery unit 50 recovers a video stream received from the random access storage device 30 through a system bus to an original signal and outputs the recovered original signal to a TV receiver 90.

The controller 40 includes a ROM for storing control program data to control the random access storage device 30 and the broadcast signal receiver 10 and a RAM for temporarily storing data generated during a control operation.

A remote controller 60 has a plurality of adjustment keys for system control, generates data corresponding to a key input, and feeds the data to the controller 40. The adjustment keys are "pause", "rewind", "rapid search", and so on.

A computer interface 70 interfaces a transmitted/received signal between the broadcast receiving system of the embodiment of the present invention and a computer. A timer 80 generates time information so that the broadcast receiving system can record a program automatically.

FIG. 5 illustrates a hard disk recording area according to the embodiment of the present invention. Here, the recording area is divided into four segments. The hard disk recording area covers the area from an outermost circumferential track (track #0) to an innermost circumferential track (track #n). The hard disk recording area is divided into video file areas #1 and #2 110A and 110B, a control information area 120, a circular buffer area 130 for time-delayed watching, and a general file area 140, to thereby enable simultaneous time-delayed watching and recording/reproducing of a broadcast program with efficiency.

The circular buffer area 130 is used to record a broadcast signal which is being broadcast and reproduce a previously recorded broadcast signal in real time. The circular buffer area 130 can be positioned anywhere in the hard disk recording area, preferably includes tracks at both sides of a center track ($2/n$) to minimize a search time of a head for time-delayed watching and recording/reproducing a specific channel broadcast signal at the same time.

The video file areas #1 and #2 110a and 110B, arranged respectively in outer circumferential tracks and inner circumferential tracks, are used to record a broadcast program at a reserved time. In the video file areas 110a and 110b, recorded video

streams are arranged uncontinuously in logical files according to a recorded time as shown in FIG. 2.

The general file area 140 is also managed in the non-continuous arranging method to store information other than continuous information like video streams.

5 The control information area 120 stores information related with each video file, such as title and time information and positions of blocks in each file.

FIG. 6 illustrates video streams recorded and stored in the hard disk recording area divided according to the embodiment of the present invention. Here, four video stream blocks are arranged in their corresponding areas. FIG. 7 illustrates a procedure of
10 processing each stream assigned as shown in FIG. 6 in a C-LOOK algorithm.

In FIG. 6, video stream #1 220 is being recorded in the circular buffer area 130 for time-delayed watching. Video stream #2 210 is already recorded for time-delayed watching. Video stream #3 230 is being recorded in video file area #2 110B and has nothing to do with a program currently being broadcast. Video stream #4 is already
15 recorded in video file area #1 110A.

If time-delayed watching and reproduction are selected simultaneously, video streams are read or recorded in an ascending track number order in the C-LOOK algorithm. In this case, a video stream I/O processing order of the HDD 34 is 4, 2, 1, and 3. Thus, video streams #1 and #3 220 and 230 are input to the dual port RAM 32 in T_{i-1}
20 and recorded in assigned recording areas of the HDD 34. Meanwhile, video streams #2 and #4 210 and 200 are read from the hard disk recording area in T_i and output to the video recovery unit 50 in T_{i+1} . On the assumption that video streams are continuously reproduced without delay, a video stream should be read from the recording area in each period so that it can be reproduced in the next period. For recording, a video stream
25 should be generated in the period previous to a recording period.

As described above, arrangement of the circular buffer area 130 in the center of the hard disk recording area can minimize an average head moving time, that is, an average search time, as compared to an otherwise case.

FIG. 8 is a simplified view of the hard disk area according to the embodiment of the present invention. In FIG. 8, tracks where two video stream blocks are recorded are spaced from n by i and j , respectively. If a circular buffer area is positioned at n , i tracks should be searched to process a video stream in the circular buffer area and other two video stream blocks in the C-LOOK algorithm. On the other hand, if the circular buffer area is positioned at track #0, $(i+n)$ tracks, an n -increased distance should be searched. In this context, the present invention can reduce a head moving time since time-delayed watching can be implemented simultaneously with recording/reproduction.

In accordance with the present invention as described above, a recording area of a recording medium is divided into a circular buffer area and a non-continuous file area in a broadcast receiving system capable of simultaneous time-delayed watching and recording/reproduction of a broadcast program. Hence, the recording area in a limited space is automatically reused and video streams are formed in logical video files. In addition, recorded video files can be selectively deleted, a head search time is reduced, and a data access rate is increased.

While the invention has been shown and described with reference to a certain preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

CLAIMS

What is claimed is:

- 1 1. A method of arranging divided recording area segments of a recording
2 medium in a broadcast receiving system having a random access storage device,
3 comprising:
4 disposing a circular buffer area in a first predetermined position of the
5 recording medium, for recording a first broadcast signal in real time while reproducing a
6 previously recorded second broadcast signal;
7 disposing a video file area in a second predetermined position of the
8 recording medium, for recording a third broadcast signal in a logical file at a
9 predetermined time; and
10 disposing a control information area in a third predetermined position of the
11 recording medium, for recording information about the first, second and third broadcast
12 signals.
- 1 2. The method of claim 1, wherein the disposing of the video file area
2 comprises dividing the video file area into a plurality of segments and individually
3 managing the segments.
- 1 3. The method of claim 1, wherein the circular buffer area and video file area
2 include blocks of fixed sizes.
- 1 4. The method of claim 1, wherein the disposing of the video file area
2 comprises uncontinuously arranging video file blocks in the video file area.
- 1 5. The method of claim 2, wherein the disposing of the video file area
2 comprises uncontinuously arranging video file blocks in the video file area.

1 6. The method of claim 1, further comprising disposing a general file area in a
2 predetermined fourth position of the recording medium, for managing files of
3 information other than continuous data like video information.

1 7. The method of claim 2, further comprising disposing a general file area in a
2 predetermined fourth position of the recording medium, for managing files of
3 information other than continuous data like video information.

1 8. The method of claim 3, further comprising disposing a general file area in a
2 predetermined fourth position of the recording medium, for managing files of
3 information other than continuous data like video information.

1 9. A method of arranging divided recording area segments of a recording
2 medium in a broadcast receiving system having a hard disk drive, comprising:
3 disposing a circular buffer area at the center of the hard disk drive, for
4 recording a first broadcast signal in real time while reproducing a previously recorded
5 second broadcast signal;
6 disposing a first video file area and a second video file area respectively in
7 an outer circumferential portion and an inner circumferential portion of a recording
8 surface of the hard disk drive, for recording a third broadcast signal in a logical file at a
9 predetermined time;
10 disposing a general file area at a boundary of the circular buffer area, for
11 managing files of information other than continuous data like video information; and
12 disposing a control information area between the circular buffer area and
13 the first video file area, for recording information about the first, second and third
14 broadcast signals.

1 10. The method of claim 9, wherein the circular buffer area is symmetrical with
2 respect to a center track of the hard disk drive recording surface.

1 11. A method of arranging divided recording area segments of a recording medium
2 in a broadcast receiving system having a hard disk drive, the method comprising:
3 forming a first area on the recording medium, for recording a first broadcast
4 signal which is currently being broadcast and reproducing a second broadcast signal previously
5 recorded in real time; and
6 forming a second area on the recording medium, for recording a third broadcast
7 signal at a reserved time.

1 12. The method of claim 11, further comprising:
2 forming a third area on the recording medium, for recording information
3 relating to the first through third broadcast signals.

1 13. The method of claim 11, wherein:
2 the first area is a circular buffer area which has blocks of fixed sizes and
3 contains continuous data; and
4 the second area is a video file area which has blocks of fixed sizes and contains
5 uncontinuous data in logical files.

1 14. The method of claim 11, wherein the forming of the second area comprises:
2 forming a first file area at an outer peripheral side of the first area; and
3 forming a second file area at an inner peripheral side of the first area;
4 wherein the third broadcast signal is to be recorded in one of the first and
5 second file areas, and a fourth broadcast signal is already recorded in the other one of the first
6 and second file areas.

1 15. The method of claim 11, further comprising:
2 simultaneously selecting time-delayed watching and reproduction; and
3 reading the first through third video streams in an ascending track number order
4 in a C-LOOK algorithm.

1 16. The method of claim 14, wherein the forming of first area comprises:
2 forming the first area so as to have tracks at both sides of a center track of the
3 recording medium.

1 17. The method of claim 13, further comprising:
2 forming a fourth area to store information other than continuous information of
3 video streams.

1 18. A method of processing broadcast signals from/on a recording medium in a
2 broadcast receiving system having a hard disk drive, wherein the recording medium has a first
3 area, for recording a first broadcast signal which is currently being broadcast and reproducing
4 a second broadcast signal previously recorded in real time, and a second area, for recording a
5 third broadcast signal at a reserved time, and a fourth broadcast signal previously recorded,
6 the method comprising:

7 inputting the first and third broadcast signals simultaneously in a first period;
8 recording the first and third broadcast signals on the first and second areas,
9 respectively, and reading the second and fourth broadcast signals from the first and second
10 areas, respectively, in a second period next to the first period; and
11 reproducing the read second and fourth broadcast signals in a third time period
12 next to the second period.

1 19. A recording medium in a broadcast receiving system having a hard disk drive,
2 the recording medium comprising:

3 a first area to record a first broadcast signal which is currently being broadcast
4 and reproduce a second broadcast signal previously recorded in real time; and
5 a second area, to record a third broadcast signal at a reserved time.

1 20. The recording medium of claim 19, further comprising:
2 a third area to record information relating to the first through third broadcast
3 signals.

1 21. The recording medium of claim 19, wherein:
2 the first area is a circular buffer area which has blocks of fixed sizes and
3 contains continuous data; and
4 the second area is a video file area which has blocks of fixed sizes and contains
5 uncontinuous data in logical files.

1 22. The recording medium of claim 19, wherein the second area comprises:
2 a first file area at an outer peripheral side of the first area; and
3 a second file area at an inner peripheral side of the first area;
4 wherein the third broadcast signal is to be recorded in one of the first and
5 second file areas, and a fourth broadcast signal is already recorded in the other one of the first
6 and second file areas.

1 23. The recording medium of claim 19, wherein the first area comprises:
2 tracks at both sides of a center track of the recording medium.

1 24. The recording medium of claim 20, further comprising:
2 a fourth area to store information other than continuous information of video
3 streams.

1 25. A broadcast receiving system, comprising:

2 a hard disk drive having a hard drive; and
3 a controller which forms a first area on the recording medium, for recording a
4 first broadcast signal which is currently being broadcast and reproducing a second broadcast
5 signal previously recorded in real time, and forms a second area on the recording medium, for
6 recording a third broadcast signal at a reserved time.

1 26. The broadcast receiving system of claim 25, wherein the controller forms a
2 third area on the recording medium, for recording information relating to the first through
3 third broadcast signals.

1 27. The broadcast receiving system of claim 25, wherein:
2 the first area is a circular buffer area which has blocks of fixed sizes and
3 contains continuous data; and
4 the second area is a video file area which has blocks of fixed sizes and contains
5 uncontinuous data in logical files.

1 28. The broadcast receiving system of claim 25, wherein the controller forms the
2 second area to comprise:
3 a first file area at an outer peripheral side of the first area; and
4 a second file area at an inner peripheral side of the first area;
5 wherein the third broadcast signal is to be recorded in one of the first and
6 second file areas, and a fourth broadcast signal is already recorded in the other one of the first
7 and second file areas.

1 29. The broadcast receiving system of claim 25, further comprising:
2 an input device to simultaneously select time-delayed watching and
3 reproduction; and
4 wherein the controller reads or records the first through third video streams in
5 an ascending track number order in a C-LOOK algorithm.

1 30. The broadcast receiving system of claim 28, wherein the controller forms the
2 first area so as to have tracks at both sides of a center track of the hard drive.

1 31. The broadcast receiving system of claim 30, wherein the controller forms a
2 fourth area to store information other than continuous information of video streams.

1 32. The broadcast receiving system of claim 25, further comprising:
2 a random access memory to temporarily store the first through third broadcast
3 signals prior to recording on and subsequent to reading from the recording medium; and
4 a video recovery unit to restore the first through third broadcast signals
5 reproduced read from recording medium and temporarily stored in the random access memory
6 to respective original signals.

1 33. The broadcast receiving system of claim 32, further comprising:
2 a timer to set the reserved time.

1 34. The broadcast receiving system of claim 32, further comprising:
2 a broadcast signal receiver comprising
3 a first radio frequency tuner to receive an external digital broadcast signal as the
4 first, second or third broadcast signal,
5 a second radio frequency tuner to receive an external analog broadcast signal,
6 a video compressor to convert the received analog signal to a digital signal and
7 compress the digital signal as the first, second or third broadcast signal, and
8 a selector to selectively enable transmission of the external digital broadcast
9 signal and the compressed digital signal to the random access memory.

1 35. The broadcast receiving system of claim 25, wherein the controller comprises:

2 a read only memory to store control program data to control the hard disk
3 drive; and
4 a random access memory to temporarily store data generated during control
5 operations of the hard disk drive.

1 36. A broadcast receiving system for processing broadcast signals from/on a
2 recording medium in a broadcast receiving system having a hard disk drive, wherein the
3 recording medium has a first area, for recording a first broadcast signal which is currently
4 being broadcast and reproducing a second broadcast signal previously recorded in real time,
5 and a second area, for recording a third broadcast signal at a reserved time, and a fourth
6 broadcast signal previously recorded, the broadcast receiving system comprising:

7 a random access memory to receive the first and third broadcast signals
8 simultaneously in a first period;

9 a hard disk drive to record the first and third broadcast signals on the first and
10 second areas, respectively, and reading the second and fourth broadcast signals from the first
11 and second areas, respectively, in a second period next to the first period; and

12 a video recovery unit to reproduce the read second and fourth broadcast signals
13 in a third time period next to the second period.

ABSTRACT OF THE DISCLOSURE

A method of arranging divided recording area segments of a recording medium in a broadcast receiving system having a random access storage device. In the method, a circular buffer area is disposed in a first predetermined position of the recording medium, for recording a first broadcast signal in real time while reproducing a previously recorded second broadcast signal, a video file area is disposed in a second predetermined position of the recording medium, for recording a third broadcast signal in a logical file at a predetermined time, and a control information area is disposed in a third predetermined position of the recording medium, for recording information about recorded files.

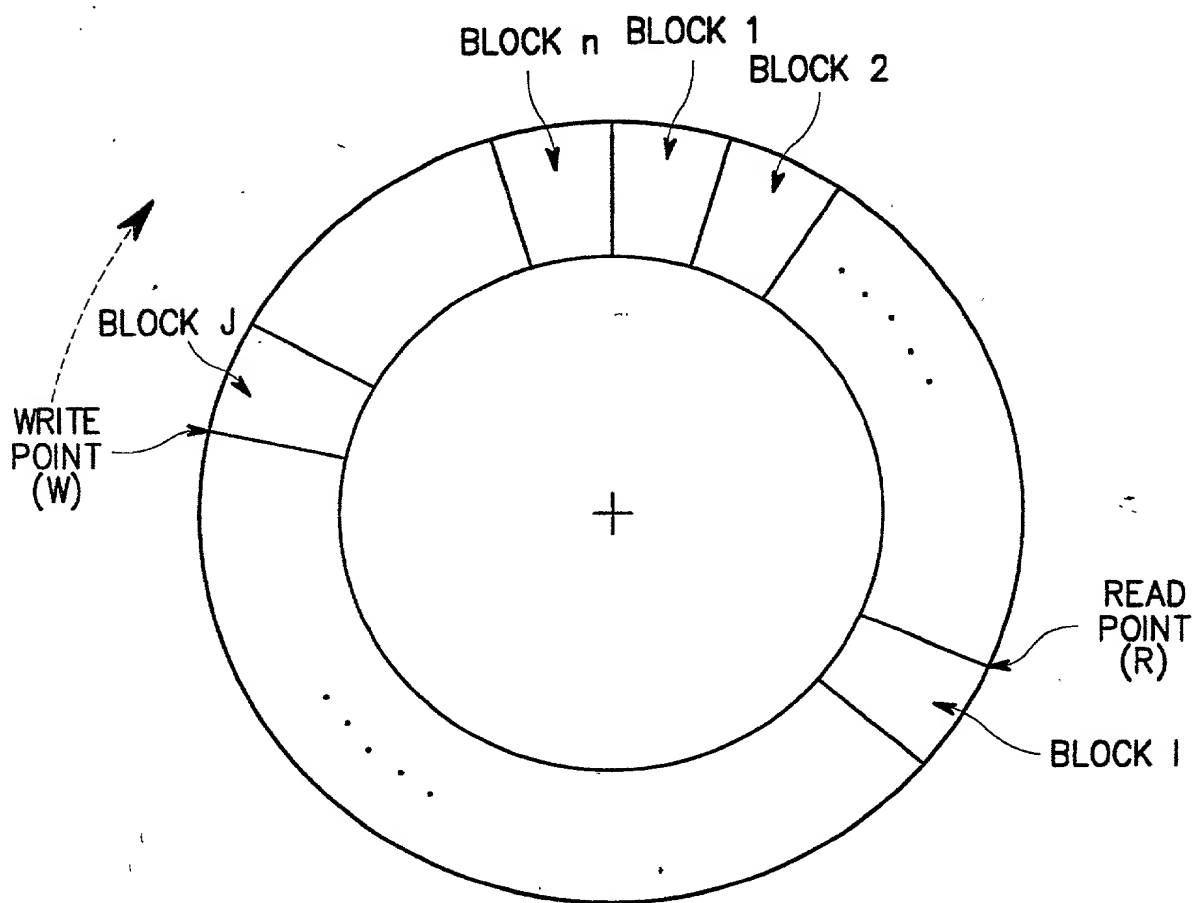


FIG. 1

PRIOR ART

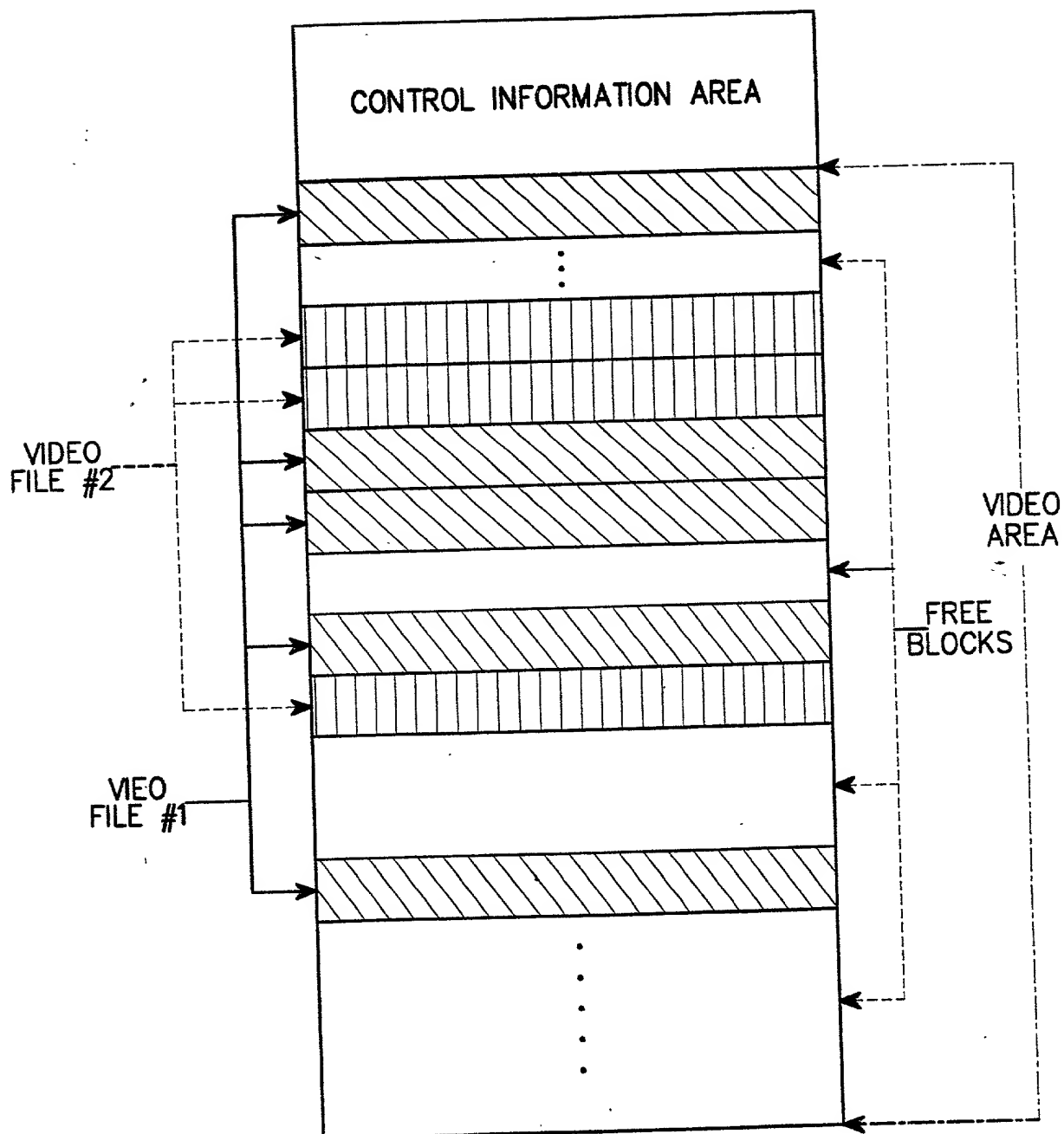


FIG. 2
PRIOR ART

PRIOR ART

FIG. 3A I/O CYCLE

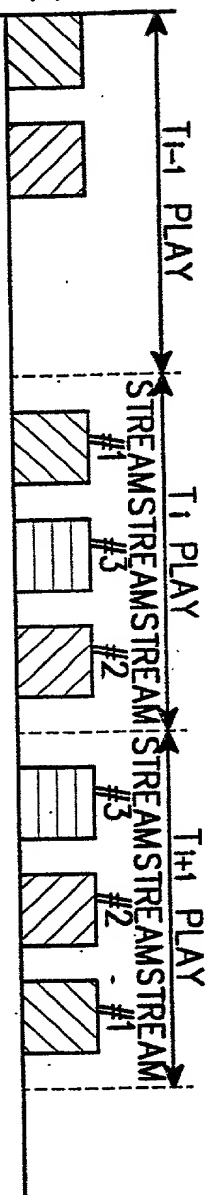


FIG. 3B VIDEO STREAM #1

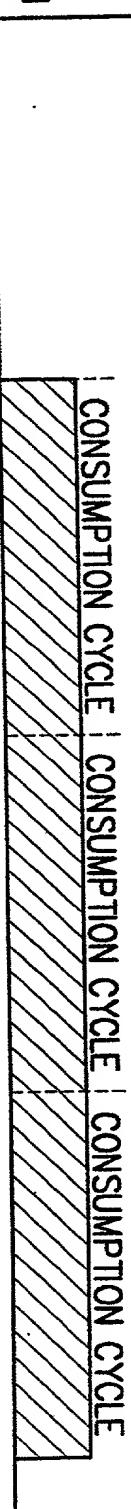


FIG. 3C VIDEO STREAM #2



FIG. 3D VIDEO STREAM #3

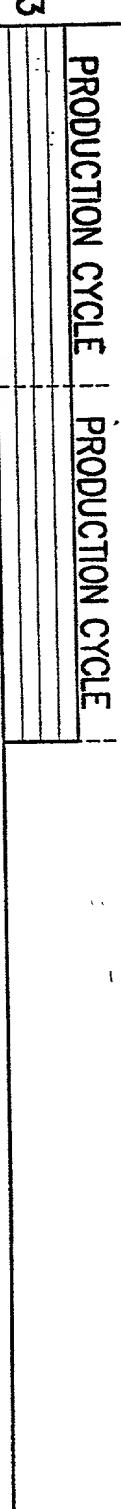
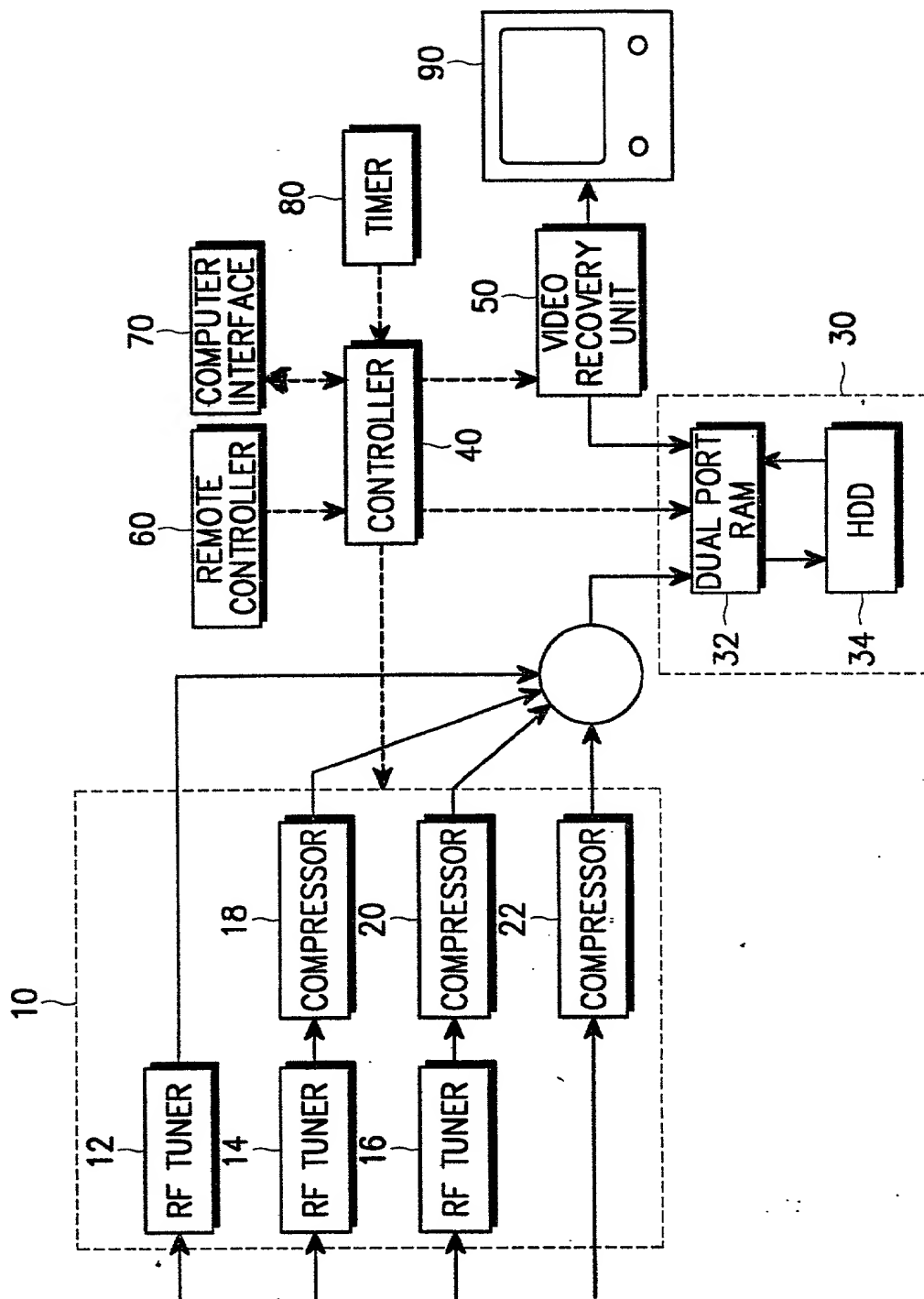


FIG. 4



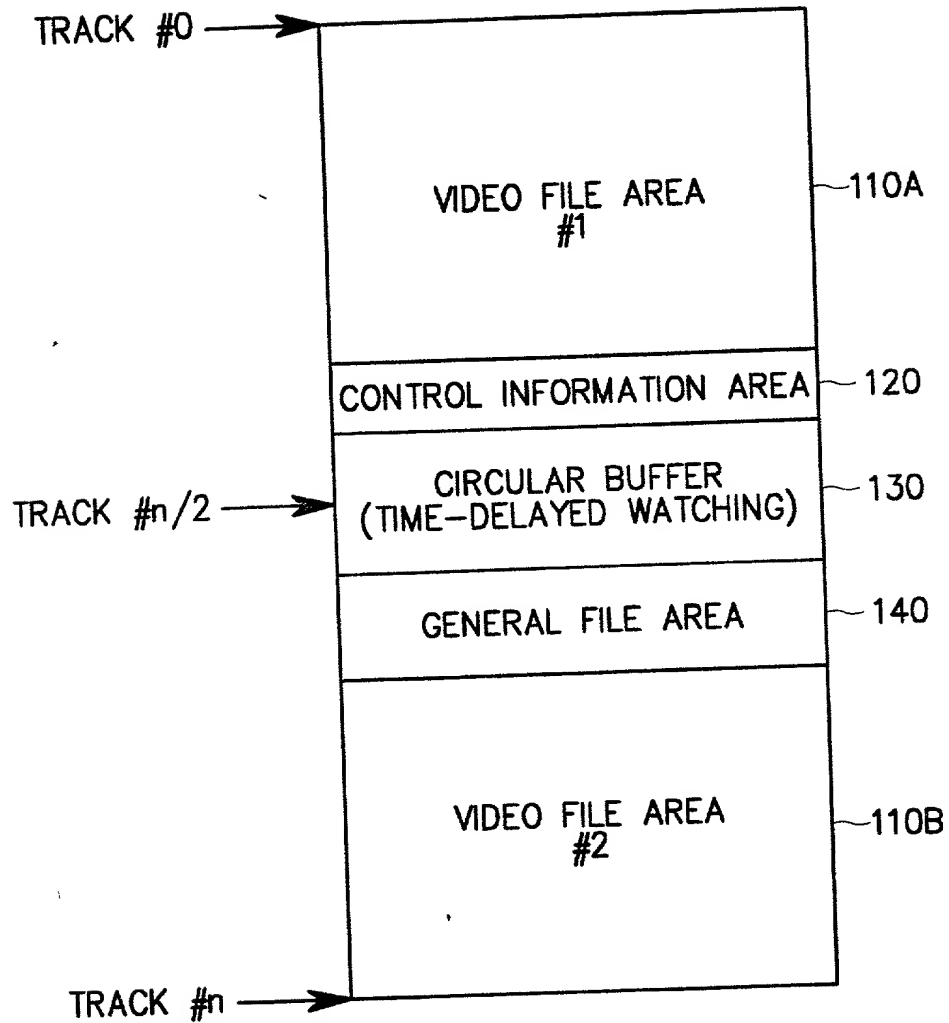


FIG. 5

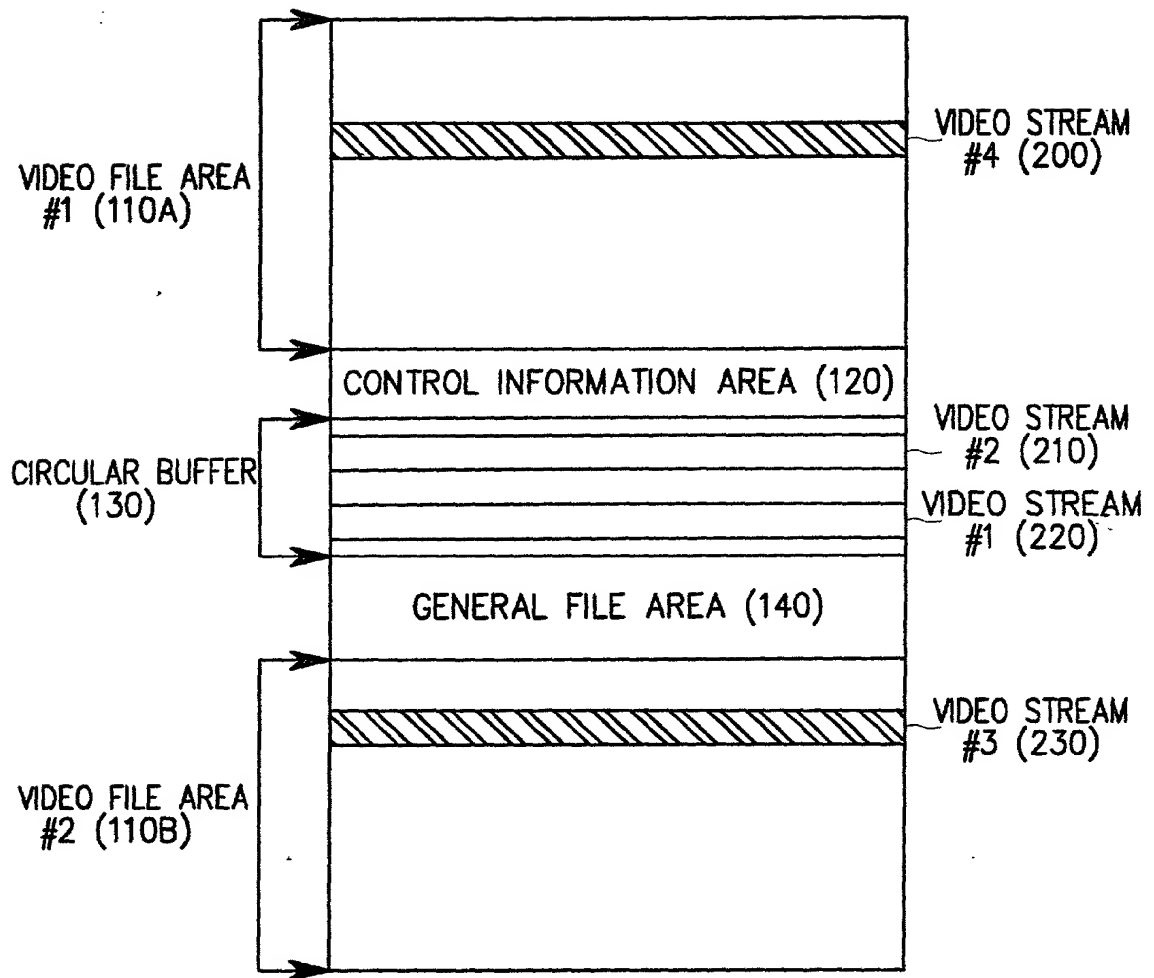
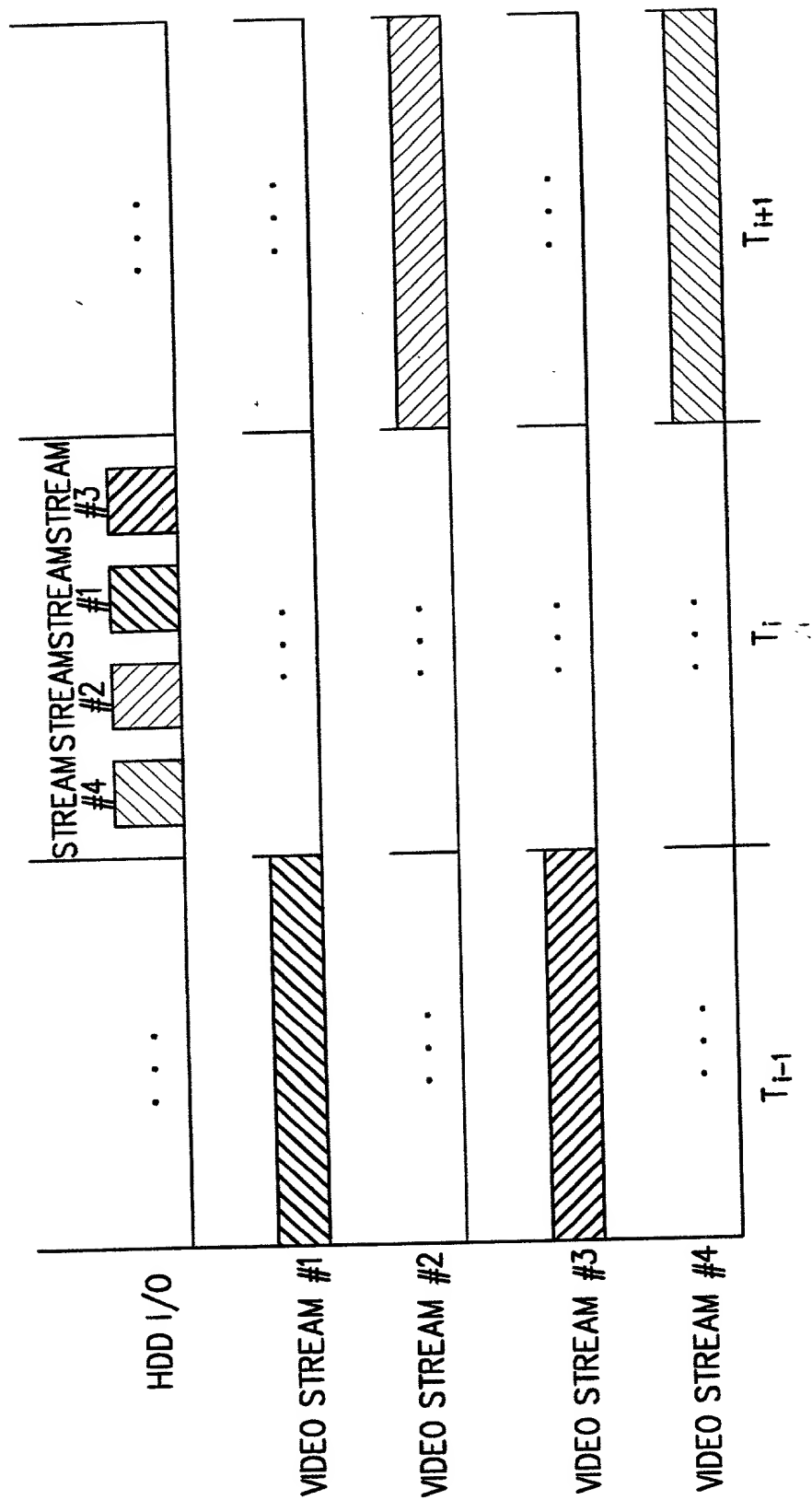


FIG. 6

FIG. 7



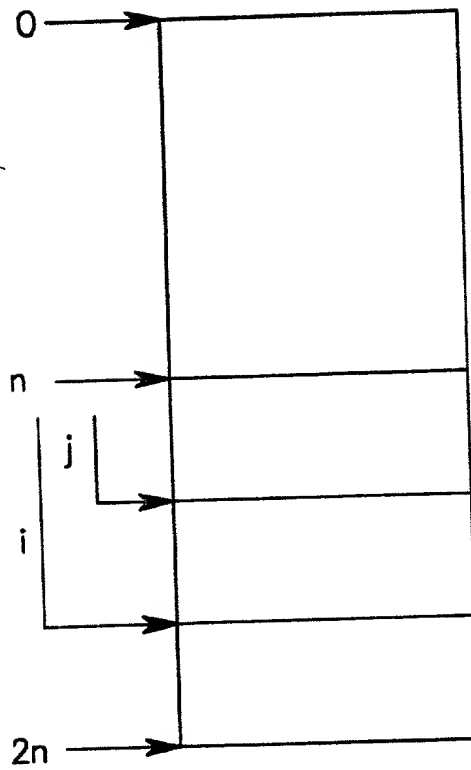


FIG. 8

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of :
Chong-Mok PARK :
Serial No. To be assigned : Group Art Unit: Unassigned
Filed: July 28, 2000 : Examiner: Unassigned
For: METHOD OF ARRANGING DIVIDED RECORDING AREA SEGMENTS
OF RECORDING MEDIUM IN BROADCAST RECEIVING SYSTEM

**LETTER TO THE EXAMINER REQUESTING
APPROVAL OF THE CHANGES TO THE DRAWINGS**

Honorable Commissioner of
Patents & Trademarks
Washington, D.C. 20231

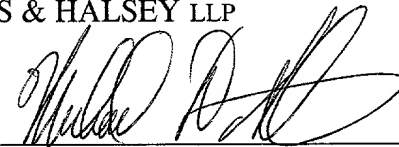
Sir:

It is respectfully requested that the Examiner having jurisdiction over the subject application approve the amendments to the drawings as indicated in RED on the attached copy of FIG. 4.

Respectfully submitted,

STAAS & HALSEY LLP

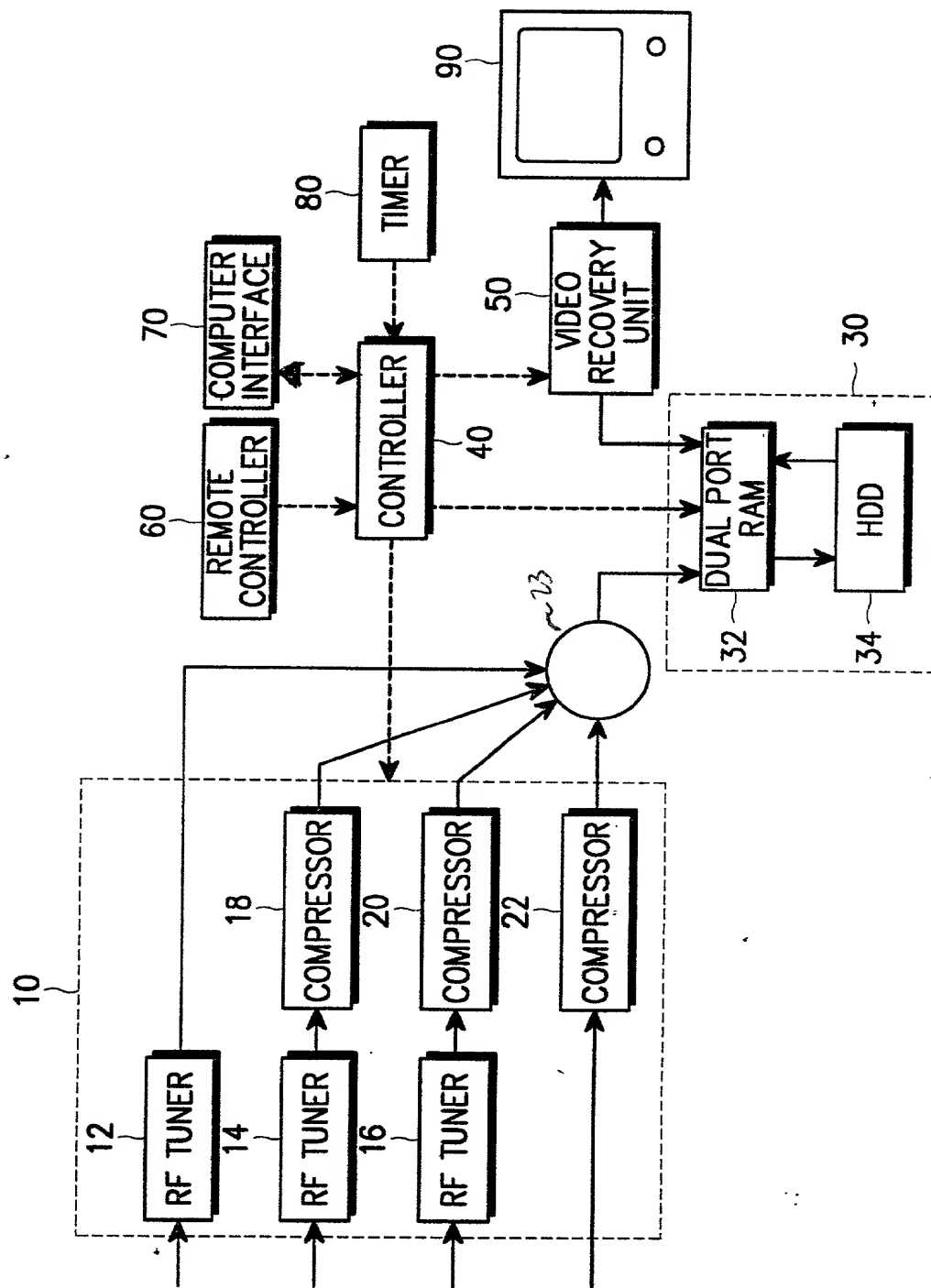
By



Michael D. Stein
Registration No. 37,240

Dated July 28, 2000
700 Eleventh St., N.W., Ste. 500
Washington, D.C. 20001
(202) 434-1500

FIG. 4



SM 1/97

UNITED STATES

Docket No.: _____

COMBINED DECLARATION/POWER OF ATTORNEY FOR UTILITY/DESIGN PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: METHOD OF ARRANGING DEVIDED RECORDING AREA SEGMENTS OF RECORD-
ING MEDIUM IN BROADCAST RECEIVING SYSTEM

the specification of which is attached hereto unless the box is checked:

☐ was filed on _____ as United States Application Number or PCT International Application Number _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefit(s) under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

30938/1999

Republic of Korea

28/07/2000

Priority Not Claimed

(Number)

(Country)

Day/Month/Year Filed

(Number)

(Country)

Day/Month/Year Filed

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application(s) in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application Serial No.)

(Filing Date)

(Status -- patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status -- patented, pending, abandoned)

I hereby appoint the following attorneys and agent to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

James D. Halsey, Jr., 22,729; Harry John Staas, 22,010; David M. Pitcher, 25,908; John C. Garvey, 28,607; J. Randall Beckers, 30,358; James M. Marsh, Jr., 24,533; William F. Herbert, 31,024; Richard A. Gollhofer, 31,106; Mark J. Henry, 36,162; Paul F. Daebeler, 35,852; Gene M. Garner II, 34,172; Ilene D. Altman, 36,371; Michael D. Stein, 37,240; Paul I. Kravetz, 35,230; Gerald P. Joyce, III, 37,648; Todd E. Marlette, 35,269; Beverly A. Pawlikowski, 36,404; Harlan B. Williams, Jr., 34,756; Richard J. Stokely, 40,383 and William M. Schertler, 35,348 (agent)

Address all correspondence to: STAAS & HALSEY, 700 Eleventh Street, N.W., Suite 500, Washington, D.C., 20001

Direct all telephone calls to: (202) 434-1500

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Chong-Mok PARKInventor's Signature Chong Mok ParkDate 26 July 2000Residence 826-30 Yoksam-dong, Kangnam-gu, Seoul, Korea Citizenship Republic of Korea

Post Office Address _____

Full name of second joint inventor, if any _____

Second Inventor's Signature _____

Date _____

Residence _____

Citizenship _____

Post Office Address _____

☐ Additional inventors are being named on separately numbered sheets attached hereto.